GE Healthcare

Centricity* Clinical Gateway

(CCG)

DICOM Conformance Statement

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1. INTRODUCTION

1.1 OVERVIEW

This DICOM Conformance Statement is divided into Sections as described below:

Section 1 (Introduction), which describes the overall structure, intent, and references for this Conformance Statement

Section 2 (Network Conformance Statement), which specifies the GEMS equipment compliance to the DICOM requirements for the implementation of Networking features.

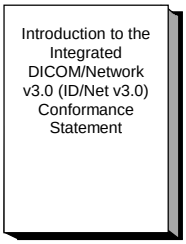
Section 3 (Modality Worklist Information Model), which specifies the GEMS equipment compliance to DICOM requirements for the implementation of the Modality Worklist service.

Section 4 (Modality Performed Procedure Step Management States), which specifies the GEMS equipment compliance to DICOM requirements for the implementation of the Modality Performance Procedure Step service.

1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

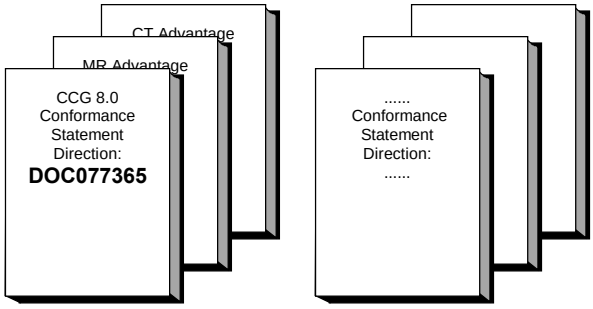
The Documentation Structure of the GEMS Conformance Statements and their relationship with the DICOM v3.0 Conformance Statements is shown in the Illustration below.

ID/Net v3.0



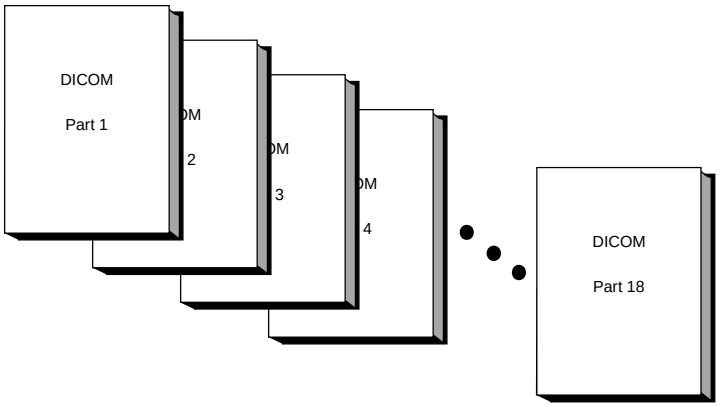
APPLICATION ENTITY SPECIFICATION
(SERVICE CLASSES, INFORMATION OBJECTS, MESSAGE EXCHANGES, ETC.)

Product Implementation:



DICOM STANDARD

Standard Specification:



This document specifies the DICOM implementation. It is entitled:

CCG
DICOM Conformance Statement
Direction DOC1117304

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GEMS network interface. Introductory information, which is applicable to all GEMS Conformance Statements, is described in the document:

Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0)
Conformance Statement
Direction: 2118780

This Introduction familiarizes the reader with DICOM terminology and general concepts. It should be read prior to reading the individ1ual products' GEMS Conformance Statements.

The GEMS Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information including Network Architecture and basic DICOM concepts, please refer to the Introduction.

For more information regarding DICOM, copies of the Standard may be obtained on the Internet at http://medical.nema.org. Comments on the Standard may be addressed to:

DICOM Secretariat
NEMA
1300 N. 17th Street, Suite 1847
Rosslyn, VA 22209
USA
Phone: +1.703.841.3200

1.3 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standard and with the terminology and concepts which are used in that Standard.

If readers are unfamiliar with DICOM terminology they should first refer to the document listed below, then read the DICOM Standard itself, prior to reading this DICOM Conformance Statement document.

Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0)
Conformance Statement
Direction: 2118780

1.4 SCOPE AND FIELD OF APPLICATION

It is the intent of this document, in conjunction with the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780*, to provide an unambiguous specification for GEMS implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEMS medical data exchanged using DICOM v3.0. The GEMS Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GEMS devices are capable of using different Information Object Definitions. For example, a GEMS CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEMS implementation. If the user encounters unspecified private data elements while parsing a GEMS Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEMS devices.

1.5 IMPORTANT REMARKS

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter-operation will be successful**. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- **Integration** - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM v3.0), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non–GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.
- **Validation** - Testing the complete range of possible interactions between any GE device and non–GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non–GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non–GE device and the stability of the image data for the intended applications.

  Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.

- **Future Evolution** - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEMS protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) described by these DICOM Conformance Statements**. The **user** should ensure that any non–GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.
- **Interaction** - It is the sole responsibility of the **non–GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1.6 REFERENCES

A list of references which is applicable to all GEMS Conformance Statements is included in the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.*

1.7 DEFINITIONS

A set of definitions which is applicable to all GEMS Conformance Statements is included in *the Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.*

1.8 SYMBOLS AND ABBREVIATIONS

A list of symbols and abbreviations which is applicable to all GEMS Conformance Statements is included in the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780*.

2. NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the CCG SCP compliance to DICOM requirements for **Networking** features.

The CCG SCP allows an imaging device to query Worklist information and sends back the information asked. It implements Modality Worklist Management SOP Class as a SCP, providing the DICOM C-FIND service as a service class provider (SCP). It also implements Procedure Step SOP Classes as a SCP, providing the DICOM N-CREATE/N-SET service as a service, to allow an imaging device to send Modality Performed Procedure Step message back.

Note that the format of this section strictly follows the format defined in DICOM Standard PS 3.2 (Conformance). Please refer to that part of the standard while reading this section.

2.2 IMPLEMENTATION MODEL

CCG SCP is implemented as a stand-alone component. Its internal Worklist is fed through a XML RPC interface and it provides to imaging devices the Modality Worklist Management SOP Class and Procedure Step SOP Class as SCP.

As it is a standalone component, its local Application Entity Title is configurable. The default value is DMWL_AE, that is used in this document.

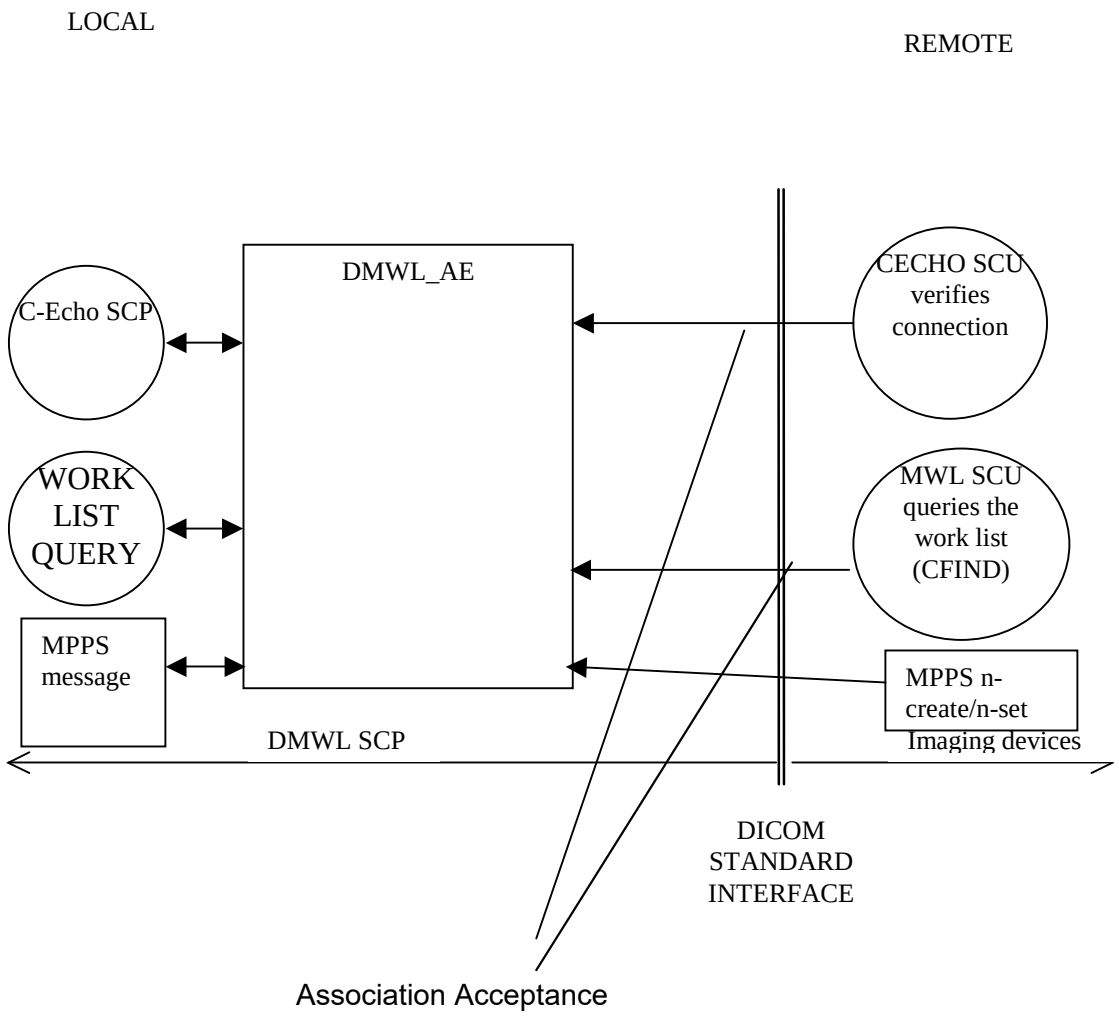
2.2.1 Application Data Flow Diagram

CCG SCP runs as a Windows service, which automatically starts when the machine is booted and at the end of the installation.

The CCG SCP does not accept any association initiated by an imaging device, who has not been granted connection authorization to this DICOM server.

The network application model for the CCG SCP is shown in the following Illustration

ILLUSTRATION 2–1
CCG SCP NETWORK APPLICATION MODEL AND DATA FLOW DIAGRAM



2.2.2 Functional Definition of AE

A remote DICOM Application Entity initiates an association for DICOM Modality Worklist Service. When DICOM SCP accepts the association, the remote AE transmits the DICOM information objects within the Worklist request to CCG SCP. Using these attributes CCG SCP queries its internal Worklist according to the matching keys given in the Worklist request. Afterwards DICOM SCP transmits the Worklist item(s) within the Worklist response back to the remote DICOM node.

A remote DICOM Application Entity initiates an association for DICOM verification Service. When DICOM SCP accepts the association, the remote AE sends a C-Echo RQ to DMWL SCP, which responds using the C-Echo RSP.

A remote DICOM Application Entity initiates an association for DICOM Performed Procedure Step Service. When DICOM SCP accepts the association, the remote AE sends a N-CREATE RQ or N-SET RQ to CCG SCP, which responds using the N-CREATE RSP or N-SET RSP.

2.2.3 Sequencing of Real-World Activities

There are no specific requirements for the sequencing of the real world activities. Information is available for querying at any time

2.3 AE SPECIFICATIONS

2.3.1 DMWL_AE AE Specification

The DMWL_AE Application Entity provides Standard Conformance to the following DICOM SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Modality Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Yes	Yes
Instance Availability Notification	1.2.840.10008.5.1.4.33	Yes	No

2.3.2 Association Establishment Policies

2.3.2.1 General

The DICOM Application Context Name, which is always accepted, is:

Application Context Name	1.2.840.10008.3.1.1.1

The AE will propose a maximum PDU length of 28 Kbytes

2.3.2.2 Number of Associations

The number of simultaneous associations supported, as a Service Class Provider is theoretically unlimited.

2.3.2.3 Asynchronous Nature

The CCG SCP AE does not support asynchronous operations (multiple concurrent operations on one association) and all operations are performed synchronously.

2.3.2.4 Implementation Identifying information

The Implementation UID for this Implementation is:

CCG SCP Implementation UID	**1.2.840.113619.6.223**
CCG Implementation Version Name	CCG 9.3.11

2.3.2.5 Association Initiation by Real-World Activity

CCG SCP does not initiate associations with another AE's.

2.3.2.6 Association Acceptance Policy

The CCG SCP accepts associations when a real-world activity CCG REQUEST takes place. The CCG REQUEST activity is defined as any activity, involving:

- Verification of the connection from another AE (C-ECHO);
- A request from a modality, or other entity, for querying the work list (MWL C-FIND);
- A request from a modality, or other entity, for sending Procedure Step (MPPS N-CREATE/N-SET);
- A request from an external system or other entity, for sending a DICOM Instance Availability Notification (IAN).

The CCG SCP will only accept an association request from an authorized AE title. This means, that a manual action is needed before an imaging device can query the CCG SCP. When receiving requests from an non authorized device, the CCG SCP will permanently reject the association request with following reason: CALLING_AETITILE_NOT_RECOGNIZED

The CCG IAN SCP accepts IAN messages from configured External systems. An IAN message will be triggered when External system receives new instances or on deletion of instances. The CCG IAN SCP activity is involves the following:

- Verification of connection from External system (C-ECHO)
- An IAN message triggered from External system with a status of ONLINE or UNAVAILABLE and sent to CCG IAN SCP.

- CCG IAN SCP retrieving the AE title from the IAN message, sending a success or failure to External system and performing C-FIND on the remote External system.

The CCG IAN SCP will only accept an association request from an authorized AE title. This means that a manual action is needed before an External system can send IAN messages to the CCG IAN SCP.

2.3.2.7 Real World Activity "Worklist Query"

The DMWL_AE accepts associations when an authorized remote DICOM Application Entity initiates a Worklist Query operation.

2.3.2.7.1 Accepted Presentation Context Table

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name**	**UID**		**Negotiation**
Basic Worklist Information - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

2.3.2.7.2 Presentation Context Acceptance Criterion

The CCG SCP evaluates each Presentation Context independently and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

2.3.2.7.3 Transfer Syntax Selection Policies

If a Presentation Context proposes several Transfer Syntaxes, the CCG will accept only one Transfer Syntax for that Presentation Context. The transfer syntax selected will be the first one found in that list: first Explicit VR Big Endian then Explicit VR Little Endian and finally Implicit VR Little Endian.

2.3.2.7.4 SOP Specific DICOM Conformance Statement for the Modality Worklist Information Model – FIND SOP Class

The DMWL_AE provides matching against query keys as described in Section 3 Modality Worklist Query Implementation.

The CCG SCP supports a configurable “inactivity timeout” that is triggered when a DICOM association is open for a long time and no worklist query is received by the SCP. When this timeout expires, the association is aborted (A-ABORT).

The CCG SCP supports a C-Find Cancel request at any time while a CCG request is processed. Upon C-Find Cancel request reception, the DMWL component stops sending matching responses and shall send a final response with the value “FE00” (i.e. Cancelled) in the status field (0000,0900).

The CCG SCP rejects C-FIND Request coming from Imaging Devices addressed to a “Called AE Title” different from its AE Title. It rejects the association with reason: “unrecognized called AE Title”.

The CCG DICOM Interface generates C-FIND response for each match with an identifier containing values of all matching key attributes. When all optional keys are supported, all such responses contain a status of pending. FF00. If some optional keys are not supported, all such responses contain a status of pending. FF01

The CCG DICOM Interface sends a C-FIND response with no identifier and a status “Success”, when the process of matching is complete.

Per imaging device configuration, when number of SPS matching the request exceeds a maximum configurable number, the DMWL SCP may send only that number of SPS and return a refused “out of resources” status (A700) with a Error comment in tag (0000,0902) DICOM PS 3.7 2003 - E.1Following are the status codes the Application may send back to the SCU Equipment while performing the requested Query.

TABLE 1 STATUS RESPONSES, RETURNED BY DMWL SCP

STATUS CODE (Hexadecimal)	RELATED FIELDS	STATUS TYPE	MEANING	DATA SET (IDENTIFIER)
0000	None	Success	Operation has been successfully competed.	No
FF00	None	Pending	Matches are continuing. Current match is supplied in the identifier and any optional keys are supported in the same manner as required keys.	Yes
FF01	None	Pending	Matches are continuing. Current match is supplied in the identifier. WARNING, that one or more optional keys are not supported for existence	Yes
A700	(0000,0902)	Failed	Number of matching items exceeds maximum number of items allowed to send for a particular device	No
FE00	None	Cancel	C-FIND operation has been cancelled by the SCU	No
C000	(0000,0902)	Failed	Unable to process due to any internal error	No

2.3.2.8 Real World Activity "Verification"

The DMWL_AE accepts associations when an authorized remote DICOM Application Entity initiates a DICOM Verification operation.

2.3.2.8.1 Accepted Presentation Context Table

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name**	**UID**		**Negotiation**
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

2.3.2.8.2 SOP Specific DICOM Conformance Statement for the Verification SOP Class

CCG SCP provides a standard conformance to this class.

DMWL_AE will generate a C-ECHO response with a status of SUCCESS for each C-ECHO request received from a device authorized to query the DMWL SCP.

2.3.2.9 Real World Activity "Procedure Step"

The DMWL_AE accepts associations when an authorized remote DICOM Application Entity initiates a procedure step operation.

2.3.2.9.1 Accepted Presentation Context Table

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name**	**UID**		**Negotiation**
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

2.3.2.9.2 Presentation Context Acceptance Criterion

The CCG SCP evaluates each Presentation Context independently and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

2.3.2.9.3 Transfer Syntax Selection Policies

If a Presentation Context proposes several Transfer Syntaxes, the CCG will accept only one Transfer Syntax for that Presentation Context. The transfer syntax selected will be the first one found in that list: first Explicit VR Big Endian then Explicit VR Little Endian and finally Implicit VR Little Endian.

2.3.2.9.4 SOP Specific DICOM Conformance Statement for the Modality Performed Procedure Step

The CCG SCP rejects N-CREATE/N-SET Request coming from Imaging Devices addressed to a "Called AE Title" different from its AE Title. It rejects the association with reason: "unrecognized called AE Title".

The CCG DICOM Interface sends a N-CREATE/N-SET response with no identifier and a status "Success", when the process is complete.

TABLE 2 STATUS RESPONSES, RETURNED BY CCG SCP

STATUS CODE (Hexadecimal)	RELATED FIELDS	STATUS TYPE	MEANING	DATA SET (IDENTIFIER)
0000	None	Success	Successful completion of the NSET or N-CREATE Request	No
0110	None	Failure	Processing Failure.	No
0111	None	Failure	Duplicate SOP Instance	No
0112	None	Failure	No such SOP Instance	No
0120	None	Failure	Missing Attribute	No

3. MODALITY WORKLIST SERVICE

3.1 DMWL MAPPING OF DICOM ENTITIES

The DMWL maps DICOM Information Entities to local Information Entities in the product's database and user interface.

TABLE 3.1-1
MAPPING OF DICOM ENTITIES TO DMWL ENTITIES

DICOM	DMWL Entity
Scheduled Procedure Step	Scheduled Procedure Step
Requested Procedure	Requested Procedure
Imaging Service Request	Imaging Service Request
Visit	Visit
Patient	Patient

3.2 WORKLIST QUERY MODULE TABLE

See DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

TABLE 3.2-1
MODALITY WORKLIST INFORMATION MODEL MODULES

Entity Name	Module Name	Reference
Scheduled Procedure Step	SOP Common	3.3.1
	Scheduled Procedure Step	3.3.1
Requested Procedure	Requested Procedure	3.3.1
Imaging Service Request	Imaging Service Request	3.3.1
Visit	Visit Identification	3.3.1
	Visit Status	3.3.1
	Visit Relationship	3.3.1
	Visit Admission	3.3.1
Patient	Patient Relationship	3.3.1
	Patient Identification	3.3.1
	Patient Demographic	3.3.1
	Patient Medical	3.3.1

3.3 WORKLIST QUERY MODULE DEFINITIONS

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) for a description of each of the query key attributes contained within the Modality Worklist Information Model.

3.3.1 Worklist Query Matching and return keys

Name	Tag	VR	Matching type	Returned value type
SOP Common				
Specific Character Set	0008,0005	CS	NO	Present if Extended char set used
Scheduled Procedure Step				
Scheduled Procedure Step Sequence	0040,0100	SQ	Sequence	1
>Scheduled Station AE Title	0040,0001	AE	Single value	1
>Scheduled Procedure Step Start Date	0040,0002	DA	Single Value &Range by meaning	1
>Scheduled Procedure Step Start Time	0040,0003	TM	Single Value &Range by meaning	1
>Modality	0008,0060	CS	Single value	1
>Scheduled Performing Physician's Name	0040,0006	PN	Single value & Wildcard	2
>Scheduled Procedure Step Description	0040,0007	LO	NO	Present with a non zero length value or absent
>Scheduled Station Name	0040,0010	SH	Single value	2
>Scheduled Procedure Step Location	0040,0011	SH	NO	2
>Scheduled Protocol Code Sequence	0040,0008	SQ	NO	Present with a non zero length value or absent
>>Code Value	0008,0100	SH	NO	Present if sequence is present
>>Coding Scheme Version	0008,0103	SH	NO	3
>>Coding Scheme Designator	0008,0102	SH	NO	Present if sequence is present

Name	Tag	VR	Matching type	Returned value type
>>Code Meaning	0008,0104	LO	NO	3
>Pre-Medication	0040,0012	LO	NO	Present with a non zero length value or absent
>Scheduled Procedure Step ID	0040,0009	SH	NO	1
>Requested Contrast Agent	0032,1070	LO	NO	Present with a non zero length value or absent
>Scheduled Procedure Step Status	0040,0020	CS	Single value	3
Requested Procedure				
Requested Procedure ID	0040,1001	SH	Single Value	1
Requested Procedure Description	0032,1060	LO	NO	Present with a non zero length value or absent Either Requested Procedure Description or Requested Procedure Code Sequence is present
Requested Procedure Code Sequence	0032,1064	SQ	NO	Present with a non zero length value or absent Either Requested Procedure Description or Requested Procedure Code Sequence is present
>Code Value	0008,0100	SH	NO	Present if sequence is present
>Coding Scheme Designator	0008,0102	SH	NO	Present if sequence is present
>Coding Scheme Version	0008,0103	SH	NO	3
>Code Meaning	0008,0104	LO	NO	3
Study Instance UID	0020,000D	UI	Single value	1

Name	Tag	VR	Matching type	Returned value type
Referenced Study Sequence	0008,1110	SQ	NO	2
>Referenced SOP Class UID	0008,1150	UI	NO	Equals to “Detached Study Management SOP Class” if sequence is non empty
>Referenced SOP Instance UID	0008,1155	UI	NO	Equals to Study Instance UID (0020,000D) if sequence is non empty
Requested Procedure Priority	0040,1003	SH	NO	2
Patient Transport Arrangements	0040,1004	LO	NO	2
Requested Procedure Comments	0040,1400	LT	NO	3
Names of Intended Recipients of results	0040,1010	PN	NO	3
Requested Procedure Location	0040,1005	LO	NO	3
Imaging Service Request				
Accession Number	0008,0050	SH	Single Value	Present
Requesting Physician	0032,1032	PN	NO	2
Referring Physician’s Name	0008,0090	PN	NO	2
Imaging Service Request Comments	0040,2400	LT	NO	3
Requesting Service	0032,1033	LO	NO	3
Reason for the Imaging Service Request	0040,2001	LO	NO	3
PlacerOrderNumberImagingServiceRequest	0040,2016	LO	NO	3
FillerOrderNumberImagingServiceRequest	0040,2017	LO	NO	3
OrderEnteredBy	0040,2008	PN	NO	3
OrderEnterersLocation	0040,2009	SH	NO	3

Name	Tag	VR	Matching type	Returned value type
OrderCallbackPhoneNumber	0040,2010	SH	NO	3
Visit Identification				
Admission ID	0038,0010	LO	Single value	2
Visit Status				
Current Patient Location	0038,0300	LO	Single value	2
Visit Relationship				
Referenced Patient Sequence	0008,1120	SQ	NO	Zero-Length field
>Referenced SOP Class UID	0008,1150	UI	NO	Absent
>Referenced SOP Instance UID	0008,1155	UI	NO	Absent
IssuerofAdmissionID	0038,0011	LO	NO	3
Visit Admission				
Patient Relationship				
Patient Identification				
Patient's Name	0010,0010	PN	Single value & Wildcard	1
Patient ID	0010,0020	LO	Single value	1
Issuer of Patient ID	0010,0021	LO	NO	3
Other Patient ID's	0010,1000	LO	NO	3
Other Patient Names	0010,1001	PN	NO	3
Patient Demographic				
Patients Birth Date	0010,0030	DA	NO	2

Name	Tag	VR	Matching type	Returned value type
Patient's Sex	0010,0040	CS	NO	2
Patient's Primary Language Code Sequence	0010,0101	SQ	NO	Return Key Not supported
>Code Value	0008,0100	SH	NO	Return Key Not supported
>Coding Scheme Designator	0008,0102	SH	NO	Return Key Not supported
>Code Meaning	0008,0104	LO	NO	Return Key Not supported
Patient's Primary Language Code Modifier Sequence	0010,0102	SQ	NO	Return Key Not supported
>Code Value	0008,0100	SH	NO	Return Key Not supported
>Coding Scheme Designator	0008,0102	SH	NO	Return Key Not supported
>Code Meaning	0008,0104	LO	NO	Return Key Not supported
Patient's Weight	0010,1030	DS	NO	2
Confidentiality constraint on patient data Description	0040,3001	LO	NO	2
Ethnic Group	0010,2160	SH	NO	3
Patient Comments	0010,4000	LT	NO	3
Patient's Address	0010,1040	LO	NO	3
Patient's Telephone Numbers	0010,2154	SH	NO	3
Patients Size	0010,1020	DS	NO	3
Patient Medical				
Patient State	0038,0500	LO	NO	2

Name	Tag	VR	Matching type	Returned value type
Pregnancy Status	0010,21C0	US	NO	2
Medical Alerts	0010,2000	LO	NO	2
Contrast Allergies	0010,2110	LO	NO	2
Special Needs	0038,0050	VR	NO	2
Military Rank	0010,1080	LO	NO	3
Region of Residence	0010,2152	LO	NO	3

Note: SCU cannot filter the responses where Matching type NO is mentioned for the attributes.

3.3.2 Matching description

The CCG SCP ignores Priority Attribute.

The CCG supports Date and Time single value matching by meaning, not by “String Compare.
Note :It means that a value encoded in the new Date (or Time) format matches the same value encoded in the old Date (or Time) format. As well, it means that the time values 11 or 1100 or 110000 shall both match the time value 110000.000.
Allowed time range is from 00:00 till 23:59 when creating updating Worklist items. If an imaging device asks exams scheduled at 24:00, it will not match any item.

When providing Time, the CCG SCP encodes it with hours, minutes and seconds (i.e. HHMMSS). The ability to send only hours (i.e. with no minutes, neither seconds) to encode 11:00 am is not used.

The DMWL component supports Person Name Wildcard matching as defined in DICOM . This includes following cases:

- Only one name component has been sent and appended with a “*”(e.g. Doe*).
- Only one name component has been sent and appended with two or more (up to 4) wildcards “*”.
- Name components have been appended with a “*”, and carets are used to separate the different components (e.g. Doe*^John*).
- Name components have been appended with a “*”, carets are used to separate the different components and trailing carets are provided. For instance:

- Doe*^John*^^^
- Doe*^John*^*^*^*

When providing Time, the DMWL SCP encodes it with hours, minutes and seconds (i.e. HHMMSS). The ability to send only hours (i.e. with no minutes, neither seconds) to encode 11:00 am is not used.

The DMWL SCP is case and accent insensitive while matching for PN VR attributes i.e. Patient's Name (0010,0010) and Scheduled Performing Physician's Name (0040,0006)

4. MODALITY PERFORMED PROCEDURE STEP SERVICE

4.1 MPPS MAPPING OF DICOM ENTITIES

The MPPS maps DICOM Information Entities to local Information Entities in the product's interface.

Mapping of DICOM Entities to DMWL Entities

Attribute Name	*Tag*	*Type*	CCG Parameter
Performed Procedure Step Relationship			
Scheduled Step Attribute Sequence	(0040, 0270)	1	
>Study Instance UID	(0020,000D)	1	Study_Instance_UID
>Referenced Study Sequence	(0008, 1110)	2	
>>Referenced SOP Class UID	(0008,1150)	1	
>>Referenced SOP Instance UID	(0008,1155)	1	
>Accession Number	(0008,0050)	2	Accession_Number
>Placer Order Number/Imaging Service Request	(0040,2016)	3	Placer_Order_Number

>Filler Order Number/Imaging Service Request	(0040,2017)	3	Filler_Order_Number
>Requested Procedure ID	(0040,1001)	2	Requested_Procedure_ID
>Requested Procedure Code Sequence	(0032,1064)	3	
>>Code Value	(0008,0100)	1	Requested_Procedure_Code_Value
>>Coding Scheme Designator	(0008,0102)	1	Requested_Procedure_Coding_Scheme_Designator
>>Code Meaning	(0008,0104)	1	Requested_Procedure_Code_Meaning
>Requested Procedure Description	(0032,1060)	2	Requested_Procedure_Description
>Scheduled Procedure Step ID	(0040,0009)	2	Scheduled_Procedure_Step_ID
>Scheduled Procedure Step Description	(0040,0007)	2	Scheduled_Procedure_Step_Description
>Scheduled Protocol Code Sequence	(0040,0008)	2	
>>Code Value	(0008,0100)	1	Scheduled_Protocol_Code_Value
>>Coding Scheme Designator	(0008,0102)	1	Scheduled_Protocol_Coding_Scheme_Designator
>>Coding Scheme Version	(0008,0103)	3	Scheduled_Protocol_Coding_Scheme_Version
>>Code Meaning	(0008,0104)	3	Scheduled_Protocol_Meaning
>>All other Attributes from Scheduled Protocol Code Sequence		3	
Patient's Name	(0010,0010)	2	Patients_Name
Patient ID	(0010,0020)	2	Patient_ID
Issuer of Patient ID	(0010,0021)	3	Issuer_of_Patient_ID
Patient's Birth Date	(0010,0030)	2	Patients_Birth_Date
Patient's Sex	(0010,0040)	2	Patients_Sex

Referenced Patient Sequence	(0008,1120)	2	
>Referenced SOP Class UID	(0008,1150)	1	Referenced_SOP_Class_UID
>Referenced Instance UID	(0008,1155)	1	Referenced_Instance_UID
Admission ID	(0038,0010)	3	Admission_ID
Issuer of Admission ID	(0038,0011)	3	Issuer_of_Admission_ID
Service Episode ID	(0038,0060)	3	Service_Episode_ID
Issuer of Service Episode ID	(0038,0061)	3	Issuer_of_Service_Episode_ID
Service Episode Description	(0038,0062)	3	Service_Episode_Description
Performed Procedure Step Information			
Performed Procedure Step ID	(0040,0253)	1	Performed_Procedure_Step_ID
Performed Station AE Title	(0040,0241)	1	Performed_Station_AE_Title
Performed Station Name	(0040,0242)	2	Performed_Station_Name
Performed Location	(0040,0243)	2	Performed_Location
Performed Procedure Step Start Date	(0040,0244)	1	Performed_Procedure_Step_Start_Date
Performed Procedure Step Start Time	(0040,0245)	1	Performed_Procedure_Step_Start_Time
Performed Procedure Step Status	(0040,0252)	1	Performed_Procedure_Step_Status
Performed Procedure Step Description	(0040,0254)	2	Performed_Procedure_Step_Description
Performed Procedure Type Description	(0040,0255)	2	Performed_Procedure_Type_Description
Procedure Code Sequence	(0008,1032)	2	
>Code Value	(0008,0100)	1	Procedure_Code_Value
>Coding Scheme Designator	(0008,0102)	1	Procedure_Coding_Scheme_Designator
>Coding Scheme Version	(0008,0103)	3	Procedure_Coding_Scheme_Version

>Code Meaning	(0008,0104)	3	Procedure_Code_Meaning
Performed Procedure Step End Date	(0040,0250)	2	Performed_Procedure_Step_End_Date
Performed Procedure Step End Time	(0040,0251)	2	Performed_Procedure_Step_End_Time
Comments on the Performed Procedure Step	(0040,0280)	3	Comments_on_the_Performed_Procedure_Step
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)	3	
>Code Value	(0008,0100)	1	Performed_Procedure_Step_Discontinuation_Reason_Code_Value
>Coding Scheme Designator	(0008,0102)	1	Performed_Procedure_Step_Discontinuation_Reason_Coding_Scheme_Designator
>Coding Scheme Version	(0008,0103)	3	Performed_Procedure_Step_Discontinuation_Reason_Coding_Scheme_Version
>Code Meaning	(0008,0104)	3	Performed_Procedure_Step_Discontinuation_Reason_Code_Meaning
Image Acquisition Results			
Modality	(0008,0060)	1	Modality
Study ID	(0020,0010)	2	Study_ID
Performed Protocol Code Sequence	(0040,0260)	2	
>Code Value	(0008,0100)	1	Performed_Protocol_Code_Value
>Coding Scheme Designator	(0008,0102)	1	Performed_Protocol_Coding_Scheme_Designator
>Coding Scheme Version	(0008,0103)	3	Performed_Protocol_Coding_Scheme_Version
>Code Meaning	(0008,0104)	3	Performed_Protocol_Code_Meaning
>All other Attributes from Performed Protocol Code Sequence		3	

Performed Series Sequence	(0040,0340)	2	
>Performing Physician's Name	(0008,1050)	2	Performing_Physicians_Name
>Protocol Name	(0018,1030)	1	Protocol_Name
>Operators' Name	(0008,1070)	2	Operators_Name
>Series Instance UID	(0020,000E)	1	Series_Instance_UID
>Series Description	(0008,103E)	2	Series_Description
>Retrieve AE Title	(0008,0054)	2	Retrieve_AE_Title
>Archive Requested	(0040,A494)	3	Archive_Requested
>Referenced Image Sequence	(0008,1140)	2	
>>Referenced SOP Class UID	(0008,1150)	1	
>>Referenced SOP Instance UID	(0008,1155)	1	
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	2	
>>Referenced SOP Class UID	(0008,1150)	1	
>>Referenced SOP Instance UID	(0008,1155)	1	
>All other attributes from Performed Series Sequence		3	
All other attributes from Radiation Dose Module and Billing and Material Code Module		3	

5. INSTANCE AVAILABILITY NOTIFICATION SERVICE

When a set of instances become available or unavailable external system will initiate an Instance Availability Notification to configured CCG IAN SCP.

5.1 PURPOSE OF REPORTED VALUES OF INSTANCE AVAILABILITY (008, 0056)

ONLINE	The instance is available and can be retrieved
UNAVAILABLE	The instance is not available. It cannot be retrieved.

5.2 USED N-CREATE ATTRIBUTES

When CCG IAN SCP receives an IAN message, it extracts the Study Instance UID and Retrieve AE title attributes and performs a C-FIND query to the External system.

Attribute Name	Tag
Study Instance UID	(0020,000D)
Referenced Performed Procedure Step Sequence	(0008,1111)
Referenced Series Sequence	(0008,1115)
>Series Instance UID	(0020,000E)
>Referenced SOP Sequence	(0008,1199)
>>Referenced SOP Class UID	(0008,1150)
>>Referenced SOP Instance UID	(0008,1155)
>>Instance Availability	(0008,0056)
>>Retrieve AE Title	(0008,0054)

5.3 RESPONSE STATUS HANDLING BEHAVIOR

CCG IAN SCP extracts the Referenced SOP Instance UID attribute from the IAN message and sets it to the Affected SOP Instance UID attribute of the N-CREATE Response it sends back to External system.

Service Status	**Further Meaning**	**Error Code**	**Behavior**
Success	Success	0000	Operation Complete
Failure	All Failures	*	Operation failed.

6. COMMUNICATION PROFILES

6.1 SUPPORTED COMMUNICATION STACKS

The DICOM Upper Layer Protocol is supported using TCP/IP, as specified in DICOM PS3.8.

6.2 TCP/IP STACK

The TCP/IP stack is inherited from the Operating System.

6.3 PHYSICAL MEDIA SUPPORT

The CCG SCP AE makes no assumptions and has no limitation pertaining to the physical media over which the TCP/IP stack is implemented

7. EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

7.1 STANDARD EXTENDED / SPECIALIZED / PRIVATE SOP CLASSES

CCG SCP does not implement any private/extended/specialized SOP class.

7.2 PRIVATE TRANSFER SYNTAX

CCG SCP does not implement any private transfer syntax.

8. CONFIGURATION

The following fields are configurable for this AE (local):

- Local AE Title
- Local IP Address
- Local Listening Port Number

The following fields are configurable:

- Inactivity Timer
- Maximum number of items to be sent to a device

- Status sent to a device when number of matching items exceed maximum number of items for that device

Note: All configurations must be performed by a GE Field Engineer.

The CCG SCP allows a per device configuration, that will lead to modify the query sent by the imaging device and/or the response sent back to the imaging device. Please refer to CCG service guide for additional information on that topic.

9. SUPPORT OF EXTENDED CHARACTER SETS

The CCG SCP supports following extended character set in all queries from Imaging Devices:
ISO-IR-100 (Supplementary set for characters used in Western European language).

It is able to process Modality Worklist queries with full matching capabilities including that extended character set.

It is able to generate Worklist items with the extended Character set supported.

It supports queries including an empty Extended character Set attribute and queries with a Single Byte extended Character Set specified although no extended characters is used in the query.

It accepts Modality Worklist queries including an unsupported single byte extended character set. It will treat unrecognized characters as wildcards and match only on characters in the default repertoire, and return a response in the default repertoire. See DICOM CP 199 Specific Character Set in Queries

10. CODES AND CONTROLLED TERMINOLOGY

10.1 FIXED CODED TERMINOLOGY

The product may send worklist items (i.e. C-Find-RSP) containing coded terminology in response to a worklist query (e.g. C-Find-RQ). The worklist elements that may contain coded terminology are listed in Table 1 above. See section 3.3 for the detailed description of the worklist modules.

TABLE 2 LIST OF WORKLIST ELEMENTS THAT MAY CONTAIN CODED TERMINOLOGY

Name	Tag
Scheduled Procedure Step Module	
Scheduled Protocol Code Sequence	0040,0008
Requested Procedure Module	
Requested Procedure Code Sequence	0032,1064

This coded terminology is provided by the Radiology Information System (RIS) connected to the CCG. The RIS is a third-party application. Therefore, the presence of coded terminology as well as their value depends only on the type of RIS.

11. SECURITY PROFILES

The product does not conform to any defined DICOM Security Profiles.

It is assumed that the product is used within a secured environment. It is assumed that a secured environment includes at a minimum:

1. Firewall or router protections to ensure that only approved external hosts have network access to the product.
2. Firewall or router protections to ensure that the product only has network access to approved external hosts and services.
3. Any communications with external hosts and services outside the locally secured environment use appropriate secure network channels (such as a Virtual Private Network (VPN))

12. CCG SCP CONNECTED TO A NON DICOM COMPLIANT RIS

When the DMWL SCP is connected to a non-DICOM compliant RIS, some mandatory attributes may be missing. In that case, the CCG SCP uses following algorithm to be able to send back that information:

- Modality (0008,0060), Scheduled Station AE title (0040,0001), Scheduled Station Name: If a match is asked on one of this attributes, the value sent back is the one asked for, otherwise value sent back is taken out of the device configuration.

- Scheduled Procedure Step Start Time (0040,0003), Scheduled Procedure Step Start Date (0040,0002) : If a match is asked on one of this attributes, the value sent back is the one asked for, otherwise value sent back is current time in Scheduled Procedure Step Start Time and current date in Scheduled Procedure Step Start Date

13. REVISION HISTORY

Revision	Date	Comment
1	22 May 2012	Initial Version
2	15 July 2013	Updated CCG Version in Header and footer sections, updated section 2.3.1, and 2.3.2.6 with IAN SCP details. Added a new section 5 with IAN service details.
3	11 Sep 2014	Revise for CCG 9.3.1
4	19 Dec 2019	Revise for CCG 9.3.11 Updated CCG version in Header page, Removed the old template page with copy right & customer information, Updated Doc id, Updated revision history to 9.3.11, Added SCU & SCP columns in section 2.3.1, replaced CECHO & CFIND with C-ECHO & C-FIND, Added Explicit VR Big Endian for presentation context in 2.3.2.9.1 section, Added note for section 3.3.1, Updated VR for 0038,0010 tag, moved Patient Size" (0010,1020) tag from Patient Medical to patient demographic group, Added tag & VR value for “Special Needs”

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